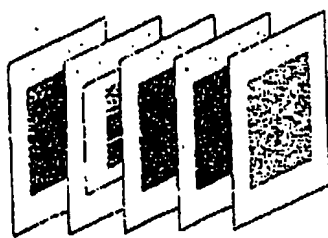
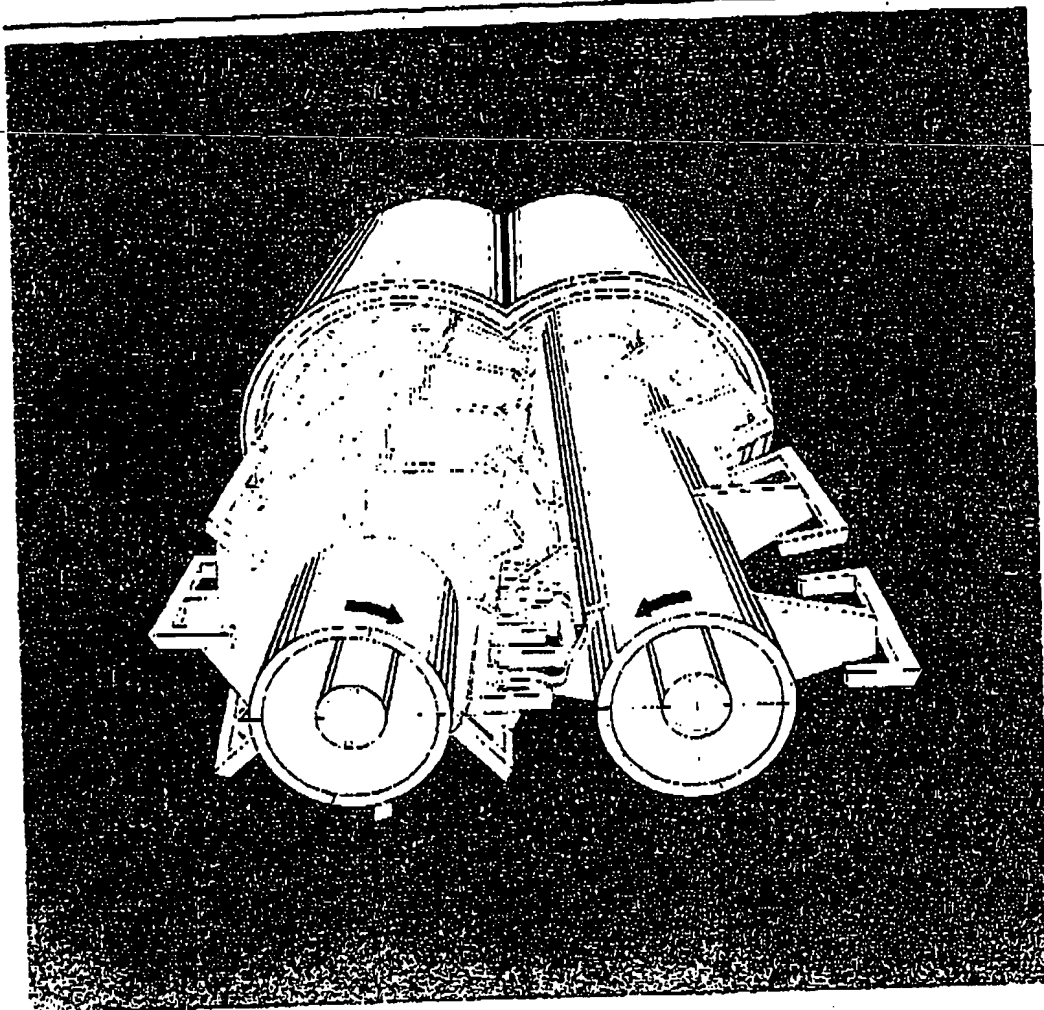


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# LIST-ORP PAT



## LIST

LEADERS IN  
HIGH VISCOSITY PROCESSING TECHNOLOGY  
ISO 9001 CERTIFIED

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## Process

### Operating Principle

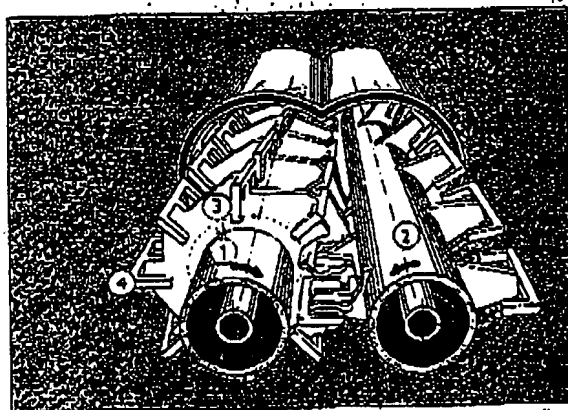
The LIST- & Opposite Rotating Processors (ORP) is a high volume twin shaft mixer/kneader for thermal processing of highly viscous, pasty, or crusting materials. It can be supplied mainly for continuous operation.

Two parallel agitator shafts intermesh as they rotate in a figure of eight housing. Both the main and cleaning shaft carry radially mounted heatable disks with U shaped mixing/kneading elements welded on the periphery.

The shafts rotate in a counterclockwise direction with different speeds in the ratio of 1:4.

The shape, position and kinetics of the mixing/kneading bars are designed to totally clean the core, disks, and elements of the other shaft as they intermesh, as well as producing an intensive mixing and kneading.

In continuous plant there is a slow axial conveying which is largely independent of the intensive lateral mixing. The optimal fill level between 40 and 75% of the equipment's volume is controlled by weir plates. High quantities of gas or vapours can disengage without difficulty.



### General Features

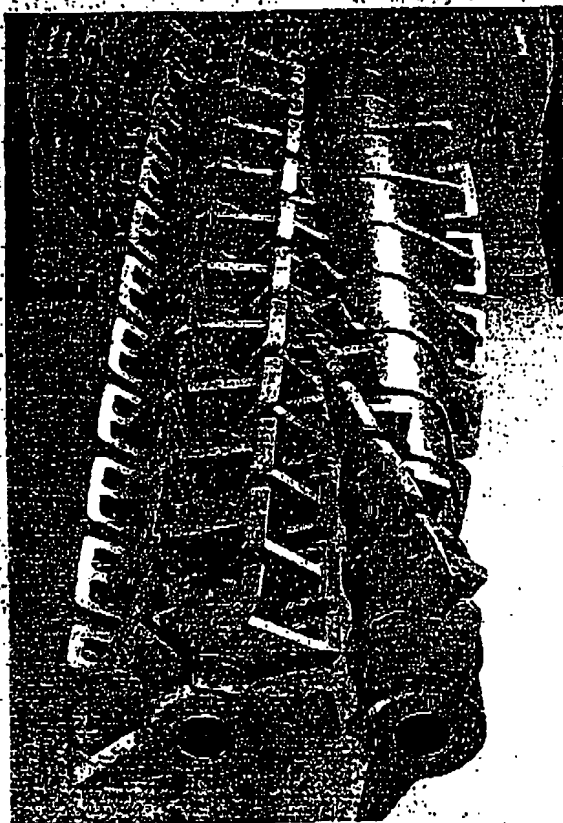
- Highly intensive mixing and kneading action in all phases - liquid, pasty, highly viscous, encrusting, and free-flowing solid.
- Extremely efficient renewal of phase boundary layers enhances both heat and mass transfer.
- The geometry of the kneading elements is arranged to produce optimum self-cleaning as well as extensive heat transfer surfaces for precise temperature control, especially for processes with critical heating or cooling requirements.

Large working volumes with fill levels up to 75% permit high throughput even with long residence times.

Reduced back mixing coupled with intensive lateral mixing maintains a narrow residence time distribution. Agitator geometries can be adjusted to vary residence time distribution over wide limits.

Substantial cross sectional areas facilitate the disengagement of gases and vapours. This is of particular importance for flash evaporation of superheated solutions, or for foaming product.

Totally enclosed design permits operation under vacuum or pressure and the processing of toxic or potentially explosive materials.



### Testing

Pilot units ranging from 27-80 liters total volume and their ancillaries are available for rent of for testing in our laboratories in Switzerland and the USA.

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## Design

### Casing

The horizontal, welded casing elements with a figure-eight cross-section are equipped with heating/cooling jackets. Optimal product fill levels could be achieved by internal dam plates. Operation under vacuum or pressure is possible.

### Agitators

Completely welded design consisting of hollow shafts on which the hollow disk elements and the kneading/mixing bars are mounted. Rotary unions deliver heat transfer medium to the shaft and the disk elements.

### Drive

Drives can be either electrical or hydraulic. The synchronisation gear with circulating oil lubrication is flanged directly to the mixer/kneader. Power transmission to the slip-in shafts is made by shrink-disk clutches allowing replacement of the agitators without dismantling the synchronisation gear.

### Wear protection

If necessary edges subject to wear can be faced with specially hard material. When serious wear is likely to be experienced, easily replaceable wear parts can be provided for the housing and agitators.

### Product discharge

Two standard discharge arrangements are available: Front/side discharge openings with externally adjustable wear plates are suitable for free flowing or liquid products. Discharge twin-screws directly integrated into the outlet casing section are specifically used for high-viscosity, pasty products.

### Shaft seals

Single or double, flexible stuffing boxes or mechanical seals are available.

### Material of construction

Stainless steels, Hastelloy, titanium nickel and other weldable materials, carbon steel.

### Standard Versions

Closed casing	Casing with cover
Product chamber -1/+2,0 bar; 300°C	-1/+0,5 bar; 300°C
Heating space 6 bar; 300°C	6 bar; 300°C
Special versions	
Pressure up to 6 bar, Temperature over 300°C	

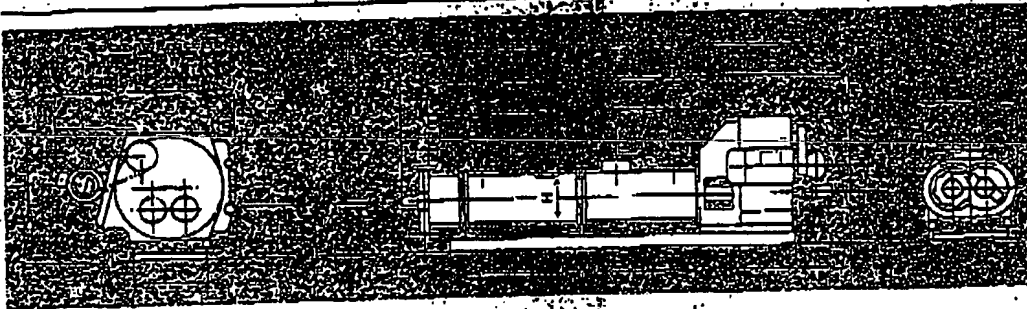
## Applications

Process	Products
Reactions Solid liquid reactions with pasty, sticky phases requiring longer residence times	anhydrous hydrofluoric acid; urea-, phenol-, and melamine resins, elastomers, dyestuff, additives, etc.
Evaporation and drying Especially for continuous vacuum drying of difficult, sticky products	distillation and production residues with solvent recovery (TDI), elastomer and polymer solutions, waxes, etc.
Devolatilisation	polymer melts
Mixing and kneading	carbon anode paste, doughs, embedding of toxic waste, etc.
Melting	products having a wide softening temperature range

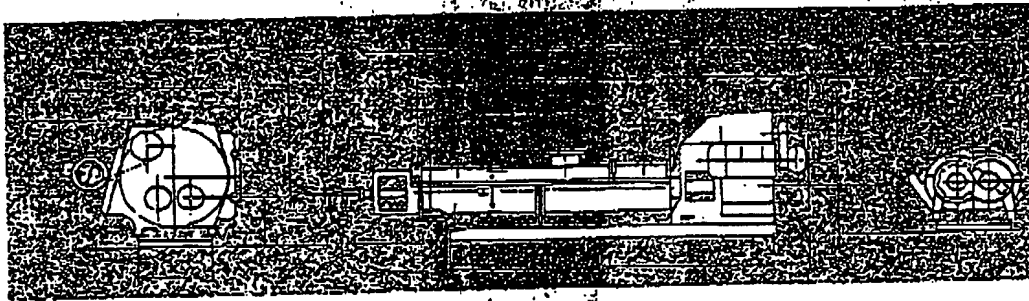
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HIGH VISCOSITY PACECUTTING TECHNOLOGY

## Dimensions



Type		Total volume liters	Weight kg	Max feed mm	Drive kW	Dimensions mm															
						A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	
LIST-ORP	160 Cond	220	5000	5.5	20	3000	2200	1600	1975	235	1760	750	320	800	1000	1750	2880	560	1050	1600	
LIST-ORP	250 Cond	300	6500	7	30	4100	2200	1700	2140	240	1990	800	360	900	1000	1850	2130	560	1125	1700	
LIST-ORP	400 Cond	490	8900	9.5	40	4700	2300	1900	2460	280	2220	900	430	1000	1000	2000	3580	630	1250	2000	
LIST-ORP	630 Cond	815	10500	13	50	5400	2300	2150	2955	300	2690	900	500	1200	1100	2200	3990	760	1375	2200	
LIST-ORP	1000 Cond	1330	13500	17	60	6100	2400	2350	3200	300	3055	1000	600	1300	1100	2400	4250	830	1400	2400	
LIST-ORP	1600 Cond	2125	18000	23	100	6900	2500	2640	3725	300	3585	1000	700	1450	1230	2650	4950	950	1550	2700	
LIST-ORP	2500 Cond	2890	27000	31	150	7800	2500	2840	4125	400	4080	1000	780	1600	1230	3100	5440	1050	1600	3000	
LIST-ORP	4000 Cond	4330	38500	41	180	8600	2700	3030	5040	400	4730	1100	900	1850	1400	3350	6140	1100	1700	3300	
LIST-ORP	6300 Cond	6805	51000	53	250	9500	2700	3230	5625	500	5230	1200	1030	2100	1600	3700	6750	1200	1950	3500	
LIST-ORP	10000 Cond	10730	67000	72	300	10700	2800	3400	6400	500	6200	1300	1220	2400	1800	4100	7730	1300	2200	4000	



Type	Total volume (liters)	Weight kg	Max. feed mm	Drive kW	Dimensions mm															
					A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	
LIST-ORP 160 A Cond	220	5500	5.5	20	4000	2200	1600	1975	235	1645	750	320	1300	1000	1750	2660	390	1650	1400	
LIST-ORP 250 A Cond	300	7000	7	30	4300	2200	1600	2135	280	1775	800	360	1500	1000	1850	2910	400	1850	1500	
LIST-ORP 400 A Cond	490	8500	9.5	40	4900	2300	1850	2465	280	2090	900	420	1700	1000	2000	3290	420	2100	1600	
LIST-ORP 630 A Cond	815	11500	13	50	5500	2300	1800	2955	300	2560	900	500	2000	1100	2200	3610	440	2350	1800	
LIST-ORP 1000 A Cond	1330	14500	17	60	6100	2400	1900	3200	300	2875	1000	600	2200	1100	2400	3890	470	2500	2000	
LIST-ORP 1600 A Cond	2125	19000	23	100	6800	2500	2190	3825	300	3405	1000	700	2300	1230	2650	4500	500	2800	2200	
LIST-ORP 2500 A Cond	2890	28500	31	150	7800	2500	2330	4410	400	3850	1000	780	2780	1230	3100	4940	530	3100	2400	
LIST-ORP 4000 A Cond	4330	40000	41	180	8600	2700	2500	5040	400	4500	1100	900	3200	1400	3350	5580	600	3600	2800	
LIST-ORP 6300 A Cond	6805	53000	53	250	9500	2700	2750	5625	500	4930	1200	1050	3800	1600	3700	5920	700	4500	2800	
LIST-ORP 10000 A Cond	10730	69000	72	300	10800	2800	3000	6600	500	5900	1300	1220	4400	1800	4100	6780	850	5300	3000	

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